



inps journal

Indiana Native Plant Society

Summer 2019

Native plant profile

American groundnut: *Apios americana*

By Joanna Stebing

My introduction to the charming species American groundnut (*Apios americana*) came as I was crawling carefully through a section of wetland in Wabash County last summer, trying to identify new plants. Right there in front of me was a clump of deep red-purple blooms

that I had never seen before. They were part of a lovely twining vine that meandered through the neighboring plants and occasionally entwined itself with them.

"What are you?" I asked. Finding new plants is like discovering a stranger who immediately intrigues you, and you want to know more, so I admit I converse with them unashamedly.

It turned out my new acquaintance was American groundnut. Like the more commonly seen hog peanut (*Amphicarpaea bracteata*), groundnut, a member of

the family Fabaceae, is a native legume that produces edible beans and tubers. It typically prefers more open spots than hog peanut, and its vines often climb higher substrates. It goes by the common names potato bean, Indiana potato and occasionally hopniss, a term which essentially refers to "potato" and is derived from the Unami language of the Algonquin

tribe. In 1749 the travelling Swedish botanist Peter Kalm wrote "Hopniss or Hapniss was the Indian name of a wild plant, which they ate at that time ... The roots resemble potatoes and were boiled by the Indians who ate them instead of bread" (Beardsley, 1939).

The common term groundnut is occasionally confused with other plants in the subfamily Faboideae, because numerous species with seeds that ripen underground logically

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earn this straightforward nickname. Luckily, most of these other plants are native to other countries, so they should not cause too much confusion.

Groundnut is a perennial herbaceous vine with alternate, pinnately compound leaves consisting of five to seven (rarely, three) leaflets. The flowers form tight axillary clusters in red, purple or red-brown, each one-quarter to one-half inch in length. The "nut" is a two- to five-inch pod that grows underground. Technically, the tubers are rhizomatous stems, not actual roots.

The plant grows in a variety of environments, but prefers moist areas such as wetlands, moist lowland forests and the banks of streams. It also seems to be opportunistic in thickets, where the plant's vining tendency takes advantage of its neighbors. The vines can climb up to 10 feet but remain herbaceous.

Groundnut – continued on page 3



American groundnut is also known as Indiana potato for the edible tubers it produces.

Joanna Stebing

My personal

By Winnie Mikeska

Last year was a good year for eastern monarchs, and there was an encouraging increase in the size of the overwintering population in Mexico, but what can we do as individuals to help monarch populations continue to grow?



Winnie Mikeska



Winnie Mikeska

Top: Tiger moth larvae
Bottom: A monarch
caterpillar munching
on a milkweed leaf

When I was a little girl in Pennsylvania, playing outside every day in summer, milkweed seeds with their silky tails drifted in the wind everywhere. I didn't know they were seeds. To me they were pretty little white puffs that we kids called Santa Clauses. If we caught one, we made a wish and blew it away. Now, more than 40 years later and living in Indiana, I rarely see milkweed seeds in the wind.

Why should we care about these weedy plants that farmers would probably like to eradicate? They are the only plant family that allows the monarch (*Danaus plexippus*) to exist, and this butterfly is the poster child for all insect life. Why should we care about pesky insects? Because insects are basic to the web of life — providing food for animals higher up the food chain and pollinating many of the plants we rely on for food. If we eradicate insects, we eradicate all life on earth — including us. It's that simple.

Now I am on a quest to plant milkweed in my yard to do my small part in preserving life on our beautiful planet. Three years ago, I purchased my first milkweed plants at the INPS native plant sale in Indianapolis, three common milkweeds (*Asclepias syriaca*) and two butterfly milkweeds (*A. tuberosa*). In 2017, I was pleased to see that all of them had survived their first winter in southern Indiana.

Two years ago at the plant sale, I purchased two more common milkweeds plus three meadow blazing stars (*Liatris ligulistylis*)* and three prairie blazing stars (*L. pycnostachya*). The milkweeds were to provide food for monarch larvae, and the blazing stars were to provide nectar for adult monarchs.

In 2018, success! The milkweeds all had monarch larvae feeding on their leaves. The blazing stars were blooming, and adult monarchs were sipping their nectar. I watched as the larvae grew, and many plump, healthy-looking caterpillars were in evidence.

Monarch larvae almost always wander off their milkweed plants and search for a sheltered hiding place to make a chrysalis. The beautiful, shiny, bright green chrysalises are hard to find, so I eagerly watched, hoping to find one. I was thrilled when I found one attached to the first common milkweed I had planted in 2016. This chrysalis held me enthralled. I checked on it several times a day for weeks. I watched it change color, and one day I could see an orange and black wing folded up inside the shell, which was becoming transparent. This was so exciting. I was eager to capture a photo of the butterfly emerging from the chrysalis. Finally, a wing partially emerged! But then it stopped. Something had killed that butterfly. I don't know what. Such disappointment. My beautiful butterfly was dead.

Monarchs are part of the web of life, and their eggs and larvae are eaten by many other insects. Early in the season, some of the eggs and larvae were eaten by a few Asian lady beetles (*Harmonia axyridis*), which I picked off, but many monarch larvae survived. I observed at least 20 fully-grown (fifth-instar) caterpillars during the summer.

monarch watch

Milkweeds play host to many insects other than monarchs, including large milkweed bugs (*Oncopeltus fasciatus*), small milkweed bugs (*Lygaeus kalmii*), milkweed longhorn beetles (*Tetraopes tetraophthalmus*), and little non-native orange oleander aphids (*Aphis nerii*).

Later in the season, my milkweeds were eaten by larvae of the milkweed tiger moth (*Euchaetias egle*), also known as the milkweed tussock moth. The caterpillars of this moth are sometimes called “harlequin caterpillars” because of the late instars’ bright colors. They were so numerous it became impossible to control them by picking them off, and I will not use insecticides. These little buggers eventually completely defoliated my common milkweed plants. Perhaps, to insure there is enough food for everyone, I just need to plant more milkweeds.

The monarch watch of the summer of 2018 was a fascinating time. Planting native plants like the two varieties of milkweed has been a fun and educational experience. I found out that even the common milkweed plant has a very pretty flower, and the butterfly milkweed flower is spectacular.

While the Xerces Society for Invertebrate Conservation reports that the western population of monarchs reached “historic lows” in 2018, the eastern monarch overwintering population in Mexico was the largest in many years, thanks to favorable weather in the eastern US and Mexico, and thanks to people like you and me who plant milkweed for them. We need to continue to promote the planting of milkweed and other native plants and discourage the use of pesticides in our yards. Anything we can do to help the monarch survive will also help other wildlife exist and continue to maintain the web of life.

Check out Monarch Watch at www.monarchwatch.org.

**According to USDA maps, Liatris ligulistylis is not native to Indiana; it is native from Alberta to New Mexico and east to Wisconsin, Missouri and Illinois.*

Winnie Mikeska lives and gardens in Corydon and is a member of INPS South Central Chapter.



Winnie Mikeska

Adult monarch feeding on nectar of meadow blazing star

Groundnut – from page 1

In his *Wildflowers and Ferns of Indiana Forests*, Michael Homoya notes that Purdue University’s Center for New Crops and Plant Products has been engaged in ongoing research to develop the tubers of *A. americana* into a commercial food crop (Homoya, 2012). As with other legumes, groundnut fixates its own nitrogen and therefore has a leg up on other crops such as potatoes, yams or sweet potatoes. There are issues with breeding and pollination, but the plant remains a hopeful example for future innovations in the efficiency of the crop industry (Juliarni, Nakamura et al., 1997).

American groundnut blooms from August to September, so if you have a local area of open wetland, moist stream banks or high moisture thickets, keep an eye out for this interesting native plant.

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Joanna Stebing is a student at Purdue University Fort Wayne and a member of the Northeast Chapter of INPS.

A new invasive in Indiana: mile-a-minute vine

Invasive plant profile

By Ellen Jacquart

In the late summer of 2017, contractors doing land management in a field in western Monroe County got a very unpleasant surprise. They found mile-a-minute vine (*Persicaria perfoliata*) clambering over shrubs and trees, a highly invasive non-native vine that had never been found in Indiana before.

Mile-a-minute is a trailing herbaceous annual vine with a shallow root system. Light green, alternate leaves have barbs on the undersides and a distinctive equilateral triangle shape. Stems have recurved barbs and distinctive, funnel-shaped



Todd Mervosh, Connecticut Agricultural Experiment Station



Mile-a-minute vine can grow up to six inches per day and smother other plants.

leafy structures, called ocreae, that surround the stem at the nodes (where leaves attach to the stem). Flowers are small and white, often inconspicuous. Fruits are deep blue berry-like achenes arranged in clusters.

Why is it a problem? This aggressive barbed vine can smother other herbaceous plants, shrubs and even trees by growing over them. Growing up to six inches per day, mile-a-minute vine forms dense mats over the top of other plants and decreases their ability to photosynthesize and make food. Eventually the smothering can kill the overtopped plants.

The closest sites for mile-a-minute vine are hundreds of miles to the east in northern Kentucky and southeast Ohio. So how did it get here? We're not sure. Perhaps birds brought in the seed, perhaps someone – against all common sense – planted it.

The good news is that the contractors recognized this invasive plant and killed it, returning

multiple times to make sure there isn't any left on the property. The bad news is that birds could already have spread this plant to nearby areas, so we all need to be on the lookout for this invasive plant.

Here's how you can tell if you've found it:

- Are its leaves shaped like equilateral triangles?
- Do the leaf undersides and stems have small thorns that curve towards the base of the plant?
- Do the stems have funnel-shaped ocreae at the nodes?

If you think you've found it, take good pictures of the identifying characteristics and report it at EDDMaps.org. This is one invasive plant we can stop – with your help.

Ellen Jacquart is president of INPS and a member of its South Central Chapter.

Governor signs rule to ban invasives

By Dawn Slack

Indiana governor Eric Holcomb signed the Terrestrial Plant Rule (312 IAC 18-3-25) March 18, designating 44 species as invasive pests. The rule will make it illegal to sell, gift, barter, exchange, distribute, transport or introduce these plants in the state.

The rule and list of banned plants are at the DNR web site, www.in.gov/dnr/6351.htm. The list can also be found in the spring, 2019, issue of *INPS Journal*.

All listed species are already present in Indiana. They will be prohibited for sale, trade, distribution, barter or transportation, beginning April 18, 2020.

Members of the Invasive Plant Advisory Committee are working to update the existing official Indiana invasive plant list and developing a fact sheet and field guide to all regulated species.

At their May 21 meeting, the Invasive Species Council discussed steps required to add Callery pear (*Pyrus calleryana*) and Norway maple (*Acer platanoides*) to the list of banned invasives.

Dawn Slack is director of stewardship for The Nature Conservancy's Indiana Chapter, chair of the Invasive Plant Advisory Committee and a member of INPS South Central Chapter.

Aug. 19, 1933 – Feb. 7, 2019

Dr. Marion T. Jackson

By Phillip Cox

How apropos that Marion loved giant trees, for he was a giant champion of the conservation of Indiana's natural resources. I'll always have great memories of Marion, whether listening to his stories about one of the last American chestnut trees in Ripley County or his descriptions of mammoth sycamores in the Wabash River bottoms, or hiking the woods and prairie of the Jackson-Schnyder Nature Preserve in western Vigo County. Marion was truly a walking encyclopedia of natural Indiana.

Marion grew up on a small farm near Versailles in southeastern Indiana. The diverse landscape was perfect for him to explore nature during his early years. Before enrolling at Purdue University in 1958, he served in the US Naval Reserve during the Korean War aboard the USS Currituck. Marion graduated in 1961 with a BS degree from Purdue's School of Forestry and Natural Resources, with Highest Distinction. In 1964, Purdue awarded him a PhD in plant ecology for his study on the "Effects of Microclimate on Spring Flowering Phenology" at Allee Memorial Woods Nature Preserve.

After a stint at Morehead State University, Marion started teaching ecology at Indiana State University in 1964 and retired after 38 years. Not one to rest, he then taught earth literacy at St. Mary-of-the-Woods College for several years.

Marion published manuscripts too numerous to list, including chapter contributions to *Natural Features of Indiana* (1966) and *Natural Areas of Indiana and Their Preservation* (1969). He was editor of the spectacular 1997 tome *The Natural Heritage of Indiana* and contributed 11 chapters himself, including "The Future of Natural Indiana: Can We Imagine It? Guide It?". To help people learn about the Indiana trees he loved, he gave us the beautiful *101 Trees of Indiana: A Field Guide* in 2004.

Marion not only wrote; he took action with many conservation organizations. In 1967, he gave testimony at hearings before the Indiana State Legislature in favor of the Indiana Natural Areas Protection Act. This act established the Indiana Division of Nature Preserves, providing the highest protection of land through state-dedicated nature preserves. Marion served as

president of the Indiana Chapter of The Nature Conservancy from 1975 to 1983 and its acting state director in 1978–1979. Serving as program ecologist, he jump-started the Indiana Natural Heritage Protection Program in 1979–1980.

The Ouabache Land Conservancy is deeply indebted to Marion for being one of its founding fathers in 2007 and for being the first to donate



Marty Jones

land to establish the state-dedicated Jackson-Schnyder Nature Preserve. That is what Marion was all about – his passion for protecting land and wildlife for future generations.

In 2017, Marion was awarded the inaugural Ouabache Land Conservancy "Marion T. Jackson Conservationist of the Year Award" to forever remember all of his contributions to saving special Indiana places. The memory of Marion and his conservation legacy will live on through his teachings, his students, his books and the incredible land ethic that he proclaimed to all he encountered.

For a detailed biographical article, see Dr. John O. Whitaker, Jr.'s "Marion Thomas Jackson: A Lifelong Naturalist, Conservationist, and Educator" (2006 Proceedings of the Indiana Academy of Science). For a video tribute, see www.treesinc.org (TREES, Inc., 2016).

Phillip Cox is president of Ouabache Land Conservancy.

Dr. Jackson was not only a prolific writer but also active in the leadership of several conservation organizations.

Phenology: Start in your own backyard

By Amanda Wanlass

Late one Sunday afternoon, while dinner is cooking, I pause to walk through my yard, visiting the same 10 plants I visit every week. I stop at each one, noting whether I see leaves, flowers or fruits. I record my observations using the Nature's Notebook app on my smartphone. I am a citizen scientist, helping to document the cycle of seasonal changes in plants as part of Indiana Phenology's Backyard Observers program. This is the story of how and why I became a Backyard Observer.

In 2009 I moved to Indiana from Utah for graduate school. I quickly discovered the plants and flowers of Indiana are different from the ones I knew growing up. I began a quest to learn all I could about the weather, plants and gardening conditions of Indiana. People I spoke with shared general advice, such as when

to plant, or mentioned how the summer seemed unusually cool and wet. In books, I mostly found standard information about non-native garden vegetables and flowers. Field guides helped me identify the new plants I was finding in the weedy patches and wild places of my new home state. Nowhere did I find dates for when things had actually bloomed last year or how that compared to other years. I began keeping records for myself, with varying degrees of success.

What I was tracking is called *phenology*, the study of recurring life cycle events in plants and animals. For plants, these events, or *phenophases*, include when they first break dormancy, flower, fruit, and drop leaves in the fall. You may recall hearing about phenology during the 2017 INPS annual conference, when Dr. Stanley Temple spoke about how Aldo Leopold kept a record of seasonal happenings for much of his lifetime.

In spring, 2017, a friend shared a post on Facebook about the USA National Phenology Network's (USA-NPN) Spring Leaf Index, showing when spring had arrived in different parts of the US. Intrigued, I spent the night devouring their web site. I learned that USA-NPN is a network of volunteer observers, research scientists, resource managers, educators and policy-makers working together to collect, store and share phenology-related information. I discovered that they have a national observation program for both professional

and citizen scientists, called Nature's Notebook. By morning I had signed up.

I began observing right away. I enjoyed the experience so much I took a 10-week course to become certified as a local phenology group leader and started Indiana Phenology in the spring of 2018. Indiana Phenology uses Nature's Notebook to gather data on the leafing, flowering and fruiting of common native plants across the state. Volunteer observers follow one or more plants year-round, answering a series of yes/no questions about whether they see leaves, flowers or fruits on their plants each time they observe. These observations are housed in the USA-NPN phenology database.

Indiana Phenology helps school groups, parks and other organizations establish Nature's Notebook monitoring locations where groups of participants can make regular observations of a shared set of plants. The Indiana Backyard Observers program helps individuals use Nature's Notebook to monitor the plants in their own neighborhoods and backyards.

I love how easy it is to collect phenology data using Nature's Notebook. It takes about two minutes per plant using their standardized observation guidelines. I love having the option to use an app to submit data right away from my smartphone. I love that my observations are used by scientists to learn cool things about plants. But most of all, I love that I now have a record of what has happened with my plants. I don't have to worry about losing my notes or organizing my observations. All of my data, along with those of over 15,000 other observers, are freely available to anyone.

As a Backyard Observer using Nature's Notebook, I now have a good way to compare the timing of seasonal changes from year to year. As more Indiana Backyard Observers add their observations, it will give me a way to compare what I see in my yard to what is happening elsewhere in the state. Recording phenological data is an easy way to document the impacts of a changing environment and will help us as we work to protect and revitalize the native plants of Indiana.

For more information or to participate in Indiana Phenology programs, visit indianaphenology.org or email info@indianaphenology.org.

Amanda Wanlass is founder of Indiana Phenology and a member of INPS Central Chapter.

phenology, n., the study of natural phenomena that recur periodically, as migration or blossoming, and of their relation to climate and changes in season



Logo of Nature's
Notebook app

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It's the role of the marketplace to be an instrument of environmental change and policy making. We are all consumers with a great potential for change. Environmental protection begins at home.

– Noel Brown

Fern Cliff: “a botanist’s paradise”

Natural area profile

By Kit Newkirk

In Putnam County, about an hour west of Indiana’s statehouse, The Nature Conservancy (TNC) protects 157 acres in its Fern Cliff Nature Preserve. The Conservancy describes Fern Cliff as “a botanist’s floral paradise” popular for its “steep forested, sandstone cliffs, lush wooded ravines, and a profusion of ferns and bryophytes.”



Lynne Tweedie

The cliffs that give
Fern Cliff Nature
Preserve its name

In designating Fern Cliff a National Historic Landmark in 1980, the National Park Service also cited its “exceptional occurrences of mosses and liverworts, including a noteworthy number of rare species,” adding that Fern

Cliff is one of the “best areas for bryophytes in the central states.” A number of specimens of rare mosses collected at Fern Cliff by DePauw University bryologist Dr. Winona Welch now reside at New York Botanical Garden’s herbarium.

Outlined on a map, the preserve resembles an arrowhead pointing east. A small parking lot and gate welcome visitors at its southwest corner. From there a fairly easy half-mile trail passes northward along the western edge, then bends eastward into rich forest and leads on to the eponymous cliffs. This is the only maintained path in the preserve.

The upland forest is “dominated by oak, beech, hickory, sugar maple, ash, wild cherry, tulip and other species. The understory contains dogwood, hydrangea, pawpaw and greenbriar, along with a large array of herbaceous plants,” per DNR. In season, look for celandine poppies (*Stylophorum diphyllum*), mayapples (*Podophyllum peltatum*), jack-in-the-pulpit (*Arisaema triphyllum*) and blue phlox (*Phlox divaricata*).

To the west, before the trail bends into the forest, one may hear the rush of waterfalls. Along the stream bed of Snake Creek, lowland forest species such as sycamore (*Platanus occidentalis*), cottonwood (*Populus deltoides*) and black willow (*Salix nigra*) prevail.

The trail leads across a backbone and emerges atop a sandstone promontory, overlooking a steep ravine hung with ferns and mosses. INPS Facebook group member Doug Skinner wrote, “It looked like a microcosm of Jurassic Park.” Small tracks down from the overlook into the ravines are steep and “very rugged,” in the words of Ellen Jacquart. Yet clambering down to the base of the cliff transports the intrepid to a very different, cool and moist microclimate appreciated by many bryophytes.

At the base of the ravine begins a first-order stream – a stream with no permanent tributaries. Spring water emerges at the base of the cliffs and flows into Snake Creek near the northern boundary of the preserve, then on to Big Walnut Creek which joins Mill Creek to become the south Eel River, and so on to the Ohio and then the Mississippi, a tenth-order stream.

Fern Cliff – continued at right

1896-1990

Dr. Winona Hazel Welch

- Born Jasper County, where in 1927 she enumerated the county's vascular flora for her master's thesis
- Protégé of Charles Deam, in whose home she stayed while checking thesis specimens
- Deam wrote, "To me there are only two kinds of mosses, big ones and small ones." He invited Welch to write a companion volume to supplement his *Flora of Indiana*. Her *Mosses of Indiana: An Illustrated Manual* was published in 1957.
- Collected mosses and liverworts around the globe, becoming a world authority on Fontinalaceae and Hookeriaceae
- First woman to chair a science department at DePauw University (DPU), first female member and president of Indiana Academy of Science, which presents an annual award for biodiversity research in her honor
- Curated DPU's Yuncker Herbarium, calling it her "life savings." Grew it to 133,500 collections. In 1987 arranged transfer of the herbarium to New York Botanical Garden, which termed it "the most significant single acquisition of specimens by the Garden since 1945"
- Was recognized as an outstanding professor with DPU's Tucker Distinguished Career and Ubben Chair awards



Dr. Welch in her laboratory at DePauw University in 1938

"I have thanked the heavens that I was a botanist in Indiana. We have the northern plants and some glacial relicts. We have the southern plants, with the bald cypress in the swamp in south-western Indiana. We have the sand dunes in the north, we have sandstone and we have limestone. What better substratum can you have than that range? Also, I have been thankful that I was born in a state that was not completely covered by the glacier – the central part of southern one-third of Indiana was not glaciated. So I have benefited by studying the plants the glacier left here and those that have come up from the south. A perfect state in which to teach botany!"

– Winona Welch

Fern Cliff – from left

The steep cliffs which give the preserve its name are an erosional outcrop of the Mansfield sandstone formation, which also contributes interesting terrain to nearby Shades and Turkey Run State Parks.

In the early 20th century, the Root Glass Company of Terre Haute quarried as much as twenty thousand tons of sandstone below the cliffs. Minerals in the sand are credited with giving the distinctive green color to the iconic Coca-Cola bottle patented by Root Glass in 1915. Today, sphagnum moss (*Sphagnum* spp.) is gradually filling remnants of the abandoned quarry.

A spur of the Big Four railroad carried away the quarried sand and brought day-trippers from Terre Haute and Indianapolis to enjoy

the natural wonders of Fern Cliff. Thanks to the efforts of TNC and allies, nature lovers can still explore this unique area more than a century on.

TNC encourages botanizing, birdwatching and photography in the preserve, but because Fern Cliff is a state-dedicated preserve, hikers must stay on the trail to do so. Rock-climbing, rappelling and collecting of species are prohibited. All organisms should be appreciated and left where they are found.

For more information and directions visit www.in.gov/dnr/naturepreserve/files/np-Fern_Cliff.pdf.

Kit Newkirk is co-editor of INPS Journal and a member of Central Chapter.

Bryophytes: small but mighty

Botany basics

By Mahalah Wilson

Imagine a shaded forest valley on a bright summer day. Only a fraction of light falls to the floor, and a small creek flows through the rays of sunlight. When you reach the water's edge your footsteps become silent as you walk across a carpet of green. Mosses and other small plants cushion your footfalls. Bryophytes tend to be found in such areas of high moisture and low sunlight but can thrive in various environments globally. While they are often

Bryophytes undergo a life cycle with an alternation of generations. The dominant stage is the *gametophyte* (gamete producing plant); the dependent stage is the *sporophyte* (spore producing plant). Gametophytes are anchored to the substrate via *rhizoids* (root hairs) that absorb water and soil nutrients.

The body of the gametophyte can come in various forms and shapes. Hornworts have flattened, undifferentiated plant bodies known as *thalli* (singular: thallus). The thallus is often only a few cells thick with very little, if any, differentiation of cell types. Mosses are considered "leafy," with stems and leaf-like appendages called *phyllidia*. Liverworts can be either thalloid or leafy depending on the species (Lepp, 2008). In some cases, gametophytes lack a *cuticle* (protective film) and take up water and nutrients through their phyllidia.

Fertilization in bryophytes requires water because the flagellated sperm swim to the egg. In some cases, male and female gametophytes are separate plants, and females secrete a sperm attractant to enhance fertilization. After fertilization, the embryo forms from a sporophyte that remains attached to the gametophyte. Some species undergo asexual reproduction via vegetative propagation from a plant fragment and/or *gemmae* (buds that can separate to form new organisms) to produce more gametophytes.

The sporophyte is considered "dependent" because it relies almost entirely on the gametophyte for water and nutrients (Lepp, 2008). There are three portions of the sporophyte: foot, seta and sporangium. The *foot* anchors the sporophyte to the gametophyte, the *seta* elevates the sporangium to aid in spore dispersal, and the *sporangium* is the chamber where spores are formed.

Unlike the majority of tracheophytes (vascular plants), bryophytes reproduce by spores instead of seeds. They must rely on dry, windy weather to spread spores. Adaptations in the sporangium may aid in protection and dispersal of spores. In some mosses, a cap-like structure, called an *operculum*, covers the opening of the sporangium. When spores are mature, the operculum is blown off by the pressure of air escaping the spore capsule, allowing for spore



Close up of thallus
with gemmae cups
on a liverwort

inconspicuous, these plants represent a large step in the evolutionary advancement of plant life from water to land.

The term *bryophyte* is used as an informal group referring to terrestrial plants that lack true vascular tissue, roots and leaves. Due to their lack of xylem and phloem, they often remain small, from one millimeter to 65 centimeters (Schofield, 2019).

There are three formal divisions of bryophytes extant today: Bryophyta (mosses), Marchantiophyta (liverworts) and Anthocerotophyta (hornworts). Of the three, mosses are the richest in species (~10,000), with liverworts having the fewest number of species worldwide (~200) (Lepp, 2008, Vanderpoorten and Goffinet, 2009).

dispersal. Specialized cells in the sporangium of some liverworts, called *elaters*, aid in the dispersal of spores (Schofield, 2019). The distinctive horn shape of hornwort sporophytes led to the naming of these plants.

Bryophytes also have important ecological roles. Rocky areas are normally colonized first by lichens during primary succession and are soon followed by mosses. These small land plants are essential in the prevention of soil erosion, especially in arid environments. When bryophytes, lichens, cyanobacteria (aquatic microorganisms capable of photosynthesis), algae, and fungi live together in the uppermost levels of soil, they may form what is called a cryptogamic crust. This shield protects the soil from wind and water erosion (Vanderpoorten and Goffinet, 2009). It is thought that hornworts are relatives of the first land plants originating from aquatic ancestors.

The term “bryophyte” comes from the Greek, meaning plants that take up water or “swell” (Vanderpoorten and Goffinet, 2009). For example, most peat mosses (*Sphagnum* spp.) have dead hyaline cells that store large amounts of water, increasing the weight of the moss by up to 20 times (Boissoneault, 2017). A few species in the US lack these cells, including large leaf sphagnum (*S. macrophyllum*), as well as *S. cribrosum* and *S. splendens*, two species that lack common names (Shaw et al., 2003). Peat moss, often found in bogs, may be dried and burned, and many coal deposits are formed from ancient decaying masses of mosses and plants.

While it may seem that bryophytes require moist environments, some species are adapted to grow in areas such as Antarctica and dry regions elsewhere (Lepp, 2008). In some species, old dried organisms may be rejuvenated by rehydration even years later; and if portions of mosses are disturbed, new growth may occur from the base of the original plant (Lepp, 2008). Over time, these layers of growth can create new soil and wonderful habitat for invertebrates.

Bryophytes are important commercially and may be useful in medical advancements. Historically, mosses have been used as bandages due to their antiseptic and absorptive

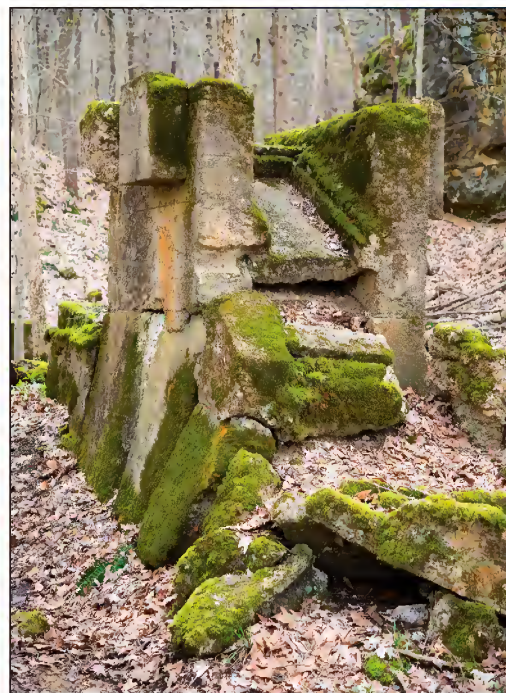
properties (Boissoneault, 2017). Today, research is being conducted to determine which species may be beneficial in treating infections and certain cancers (Vollár et al., 2018).

Bryophytes may be small, but they are mighty. Because of their size, many species cannot be identified before fertilization and production of a sporophyte. The use of a hand lens can greatly aid in identifying bryophytes in the field, although many species require more magnification, including use of a compound microscope (one with two lenses). The next time you step outside, try to spy one of these little gems. You may be surprised by the diversity of the microenvironments under your feet.

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Lyne Tweedie

Mosses grow on the ruins of an abandoned sandstone quarry at the Fern Cliff natural area.

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Mission

To promote the appreciation, preservation, scientific study, and use of plants native to Indiana.

To teach people about their beauty, diversity, and importance to our environment.

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Share online: Send information for posting to webmaster@indiananativeplants.org.

Speakers set for President's message Nov. 9 conference

By Ellen Jacquart

Can I tell you how delighted I am to be president of INPS? I've been involved in this group for almost as long as it has existed, and now I have the honor of leading it for the next two years.

By any measure, this is a vibrant and growing organization. Our paid memberships continue to increase; our seven chapters are getting more and more active with offerings of field trips, talks and other events; we are publishing our first book (*Wake Up, Woods*) this year; in June we held our first overnight bus tour since 2010 to west central Ohio; and we are holding the first ever photo contest for INPS members. (For details on how to enter, see indiananativeplants.org/inps-photo-contest.) For a volunteer-led organization, there's so much going on!

You can help INPS become even better. First, volunteer to help your local chapter, the native plant sale and auction, the annual conference, the Letha's Fund grant program, or any of our other initiatives. Just go to indiananativeplants.org to read about all our activities and connect with those who need your help. Second, if you have thoughts on what INPS should be doing to better fulfill our mission, please send an email to president@indiananativeplants.org. All ideas are welcome as we look to the future of INPS.

I'm looking forward to working with all of you! 🌱

Need a grant?

October 1 is the application deadline for INPS general fund grants. Awards will be announced Nov. 9 at the annual conference. Funds will be provided as reimbursement after a project is completed. Applications must fit one of three categories: research, land management and restoration, or demonstration garden.

However, Letha's Youth Outdoor Fund still accepts applications any time of year, restricted to educational field trips: transportation for students or youth groups, naturalist fees and supplies. These awards are also disbursed as reimbursements of actual costs.

For details, see the winter 2017-18 issue of *INPAWS Journal* or indiananativeplants.org/about-us/grants-awards-2. 🌱

Planners have assembled an impressive lineup of speakers for the INPS annual conference Saturday, Nov. 9, at the Grand Wayne Convention Center in Fort Wayne.

Keynote speaker will be Patrick McMillan, Emmy Award-winning host of the PBS nature program "Expeditions with Patrick McMillan." His talk will be "The Holistic Landscape: Diversity Breeds Diversity." McMillan earned his PhD from Clemson University, where he teaches in the department of forestry and environmental conservation. He is also director of South Carolina Botanic Gardens. His new book, *Gardening with Wild American Eyes*, is due out in 2020.

Geologist Tony Fleming will present "Why Does This Plant Grow Here ... But Not There? The Geology-Botany Connection." Fleming will also lead two fascinating hikes through Chain O' Lakes State Park and Glacial Esker Nature Preserve on Friday, Nov. 8.

Kevin Tungesvick, senior ecologist with EcoLogic in Bloomington, will talk about the impact of climate change on native plants. Sharon Sorenson, Evansville author of *Planting Native to Attract Birds to Your Yard*, will discuss attracting birds with natives. Alyssa Nyberg, who works with The Nature Conservancy on the Kankakee Sands restoration, will give a presentation on growing natives from seed.

While the conference will take place on Saturday, activities are also planned for Friday and Sunday. In addition to Fleming's hikes, Friday offerings include guided hikes or walks at Eagle Marsh, Fox Island County Park, the new Riverfront Park and Foellinger Freimann Botanical Conservatory. On Friday evening a reception at the Hilton will welcome conference goers. On Sunday morning Audubon Society members will lead a birding hike at Eagle Marsh.

The Hilton Fort Wayne is connected to the convention center; a block of rooms has been reserved for INPS. To be assured of a room, make reservations by Oct. 18.

Conference registration brochures are being mailed, and updates can be found at indiananativeplants.org/gatherings/annual-conference. Conference chairs are Ronnie Greenberg of INPS Northeast Chapter and Nancy Hill of Central Chapter. 🌱



Clemson.edu



Acres Land Trust

Speakers Dr. Patrick McMillan (top) and Tony Fleming

Chapters out and about

INPS at work



North

North Chapter members participated in several community events in the first half of the year. On March 23 members had a booth at the LaPorte Master Gardeners flower show. On April 22, Earth Day, members staffed a table at the National Association of Interpretation event in South Bend.

Members helped ACRES Land Trust clean up one of their properties in New Paris April 6; a truck filled with eggs had left the road and ended up on the property. INPS members and ACRES volunteers cleaned up the remaining debris and planted native plants in the damaged section of land.

While some of the group's field trips are limited to members due to the sensitivity of certain sites, Nathanael Pilla, North Chapter field trip coordinator, has interspersed this year's membership field trips with ones open to the public. Our first field trip of the season was a public hike May 4 at Warren Woods State Park, just over the border in Sawyer, MI. The 311-acre Warren Woods is a hidden gem in dunes country. It contains some of the last old growth trees in the region. Pilla led

attendees through this beech-maple forest system that was full of spring ephemerals. On June 1, chapter member and botanist Scott Namestnik led a small group of members on a trip to The Nature Conservancy's rare fen in Hudson Lake. It was an opportunity to see the sedges and orchids that make this fen so special.


As a memorial to late member and botanist Keith Board, North Chapter board members created the Keith Board Memorial Scholarship. The scholarship is open to high school and college students in the North Chapter region. The scholarship includes INPS membership dues and funds to attend the annual conference.

Southwest

Southwest Chapter (SWINPS) members were invited to a behind the scenes tour of Mesker Park Zoo and Botanic Garden in March. The tour was led by Paul Bouseman, assistant zoo director, former horticultural curator and current horticultural staff. The staff showed how they use native plants to create exotic-looking displays near animal encounter areas.

Members staffed a booth at Wesselman Nature Center for Earth Day April 27, passing out information on INPS, using native plants in the landscape, and removing invasive species.


Digging has begun for the chapter's Sept. 14 plant sale. The first dig was in conjunction with University of Evansville botany students who are also conducting studies on monarch milkweed species preferences. All of the digs are on private property, by invitation only. Last year we were able to offer approximately 2,500 plants for sale.

On June 22-23, The Southwest Indiana Master Gardeners held their biennial garden walk, "Tour de Fleur." SWINPS sponsored the garden of Daren and Pam Drach. Pam is chapter treasurer. Approximately 800 visitors were expected. Members provided information on gardening with native plants and removal of invasive species and recruited new members for INPS. 

INPS plant sale is a success

Preliminary results show that the INPS native plant sale May 11 brought in record income of over \$11,000 for the organization's mission. More than 50 knowledgeable volunteers helped stage the annual event in the gymnasium of Park Tudor School in Indianapolis.


More than 2,000 plants were donated, most by members, dug up from their own yards, from "rescue digs" on construction sites, or large gardens. Woody Warehouse, Spence Restoration Nursery and Native Plants Unlimited donated some plants and sold others to INPS at discounted prices to round out the variety of plants.

INPS president Ellen Jacquart's pre-sale talk on the new Terrestrial Plant Rule banning 44 invasive species was attended by 77 individuals, and a record crowd of 544 people bought multiple plants each. The auction, featuring unique or very large specimens, generated 78 successful bids of native trees, shrubs and wildflowers. Ten members, most new and some renewers, signed up during the event. 



Kit Newkirk

INPS board meetings

The INPS board will meet July 11 and Oct. 11 at The Nature Conservancy office, 620 E. Ohio St., Indianapolis, 1-4 p.m. Members are always welcome. 

Wizard patch works magic with kids

By Amy Perry

Grade schoolers and teens are having fun learning about nature thanks to an INPS program, the Native Plant Wizard Patch. They also enjoy a feeling of achievement by earning an actual cloth patch (pictured). Similar to a scouting badge, the patch educates youth about native plants and their importance in the environment.

In 2013 INPS member Ann Foster noticed how much her grandson and other children enjoyed the patch programs at US national parks. To create a similar program for INPS, she consulted with parents and kids and came up with the name “wizard” for someone who earns the patch. Along with Wendy Ford, Amy Perry, Norma Wallman and Kathy Hohman, Ann developed trial materials. Kathy ensured the patch meets state science teaching standards.

Ann introduced the program at the INPS 2013 conference, and Dawn Slack promoted it widely in 2014. Materials were posted on the INPS web site. However, the program lay dormant until 2018, when the Girl Scouts of Central Indiana expressed interest. After meeting with Tom Hohman, Angela Sturdevant, Chris Carlson and Ruth Ann Ingraham, the Girl Scouts decided to include it in their patch program for badges developed by other groups.

The new project coordinators are Amber Slaughterbeck of Vigo County and Nicole Messacar of LaPorte County. The program includes insights contributed by Dawn Slack and Amber. Amber led a group in Vigo County and Dawn, then INPS youth outreach coordinator, worked with naturalists around the state who used the program and provided feedback.

A leader manual contains practical suggestions and 20 customizable hands-on activities, mostly outdoors. Participants complete a minimum of 10, 12 or 15 activities, depending on age. Wizards In Training (WITs) hike or walk to an ecosystem such as a pond or forest, explore it and answer questions about it by writing, drawing or affixing stickers in a workbook. WITs might listen for sounds with eyes closed, smell the air, look for insects and other natural objects, and handle plants. Young people learn a broad spectrum of topics from basics, such as how to recognize and treat poison ivy, to more sophisticated concepts, such as the interdependence of various parts of an ecosystem.

Topics are poison ivy, our state tree the tulip poplar, other trees, butterfly-attracting plants, caterpillars, the forest plant community, the prairie plant community, native plants, invasive plants, woodland ferns, shrubs, vines, fall leaves, wetlands, streams and rivers, leaf characteristics, harvesting native seeds, and the essential role of native plants. A nature scavenger hunt and a “show-and-tell-to-an-adult” underscore what is learned.

The Girl Scout patch page links to the INPS Wizard page, indiananativeplants.org/education/native-plant-wizard. Girl Scouts will buy their own version of the patch, with the Girl Scout logo, from the Girl Scout store. Other participants will request the patch by emailing wizard@indiananativeplants.org.

The program is free and any type of group can participate, e.g., church groups, clubs, campers or home schoolers. It is hands-on, appealing to youth who may not be traditional students; it provides the intellectual and emotional benefits of nature; and it is tangible.

Advantages to leaders and teachers are that the patch meets state education standards and is adaptable for various ages, even within the same group. Everything the leader needs is either provided or listed. The leader manual provides a script to customize as needed. The materials are in a simple, easy-to-follow format. For many topics the manual lists web and book references.

When Amber Slaughterbeck led a group of 20 youth at Wabashiki Fish and Wildlife Area, demand was so great she had to turn kids away. “They loved getting outside and figuring things out,” she said. “We explored wetlands every day for a solid week. We used binoculars and insect nets and collected leaves. The kids ... were super excited about getting the patch.”

Kathy Hohman, who led a group of 16 at Plainfield’s Sodalís Park in Hendricks County, said, “The kids were so proud of themselves when they got the patch.”

For information or to help with the Native Plant Wizard program, contact wizard@indiananativeplants.org.

Amy Perry is a member of INPS Central Chapter.





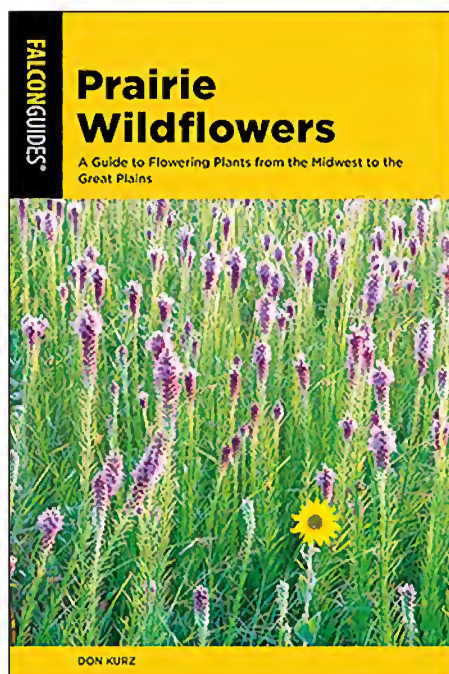
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Book review

Prairie Wildflowers: A Guide to Flowering Plants from the Midwest to the Great Plains, by Don Kurz,
Falcon Guides, Rowman & Littlefield Publishing Group, Guilford, CT, Helena, MT, 2019



Reviewed by Paul Rothrock

Don Kurz has a fine series of picture guides to wildflowers of the Midwest, including those for Arkansas, Illinois and the Ozarks. This one covers the historic tallgrass (and mixed grass) prairie region that extends from western Indiana to the eastern Dakotas and south to northeast Texas. Most of the book's 350 species are showy forbs or shrubs specific to tallgrass prairies or constructed prairies of the region. It also includes 16 commonly introduced weeds, but avoids the grasses, sedges, and other non-showy species.

Ever the nature educator, Kurz offers a brief introduction to the history and variety of prairies. His treatment of the tallgrass prairie, in particular, describes six community types; in short, just as there are numerous forest types, so too is there a variety of prairies. For the beginner, the introduction has a concise review of plant terminology, which is further supported by an extensive glossary.

The core of the paperback is the species treatment which is divided by flower color. Within each color the species are arranged alphabetically by family and by scientific name. However, do not fret; common names are prominent. Individual species are illustrated by a single generous-size photo. The one shortcoming for me is that species identification benefits from details showing select portions of a plant that may not be obvious in a single image. For these one must rely upon the carefully written descriptions.

In one species description, Kurz reports that Native Americans "used great blue lobelia in love potions. The roots were finely chopped and mixed into the food of a quarrelsome couple without their knowledge. This ... would avert divorce and make the pair love each other again" (p. 194).

In a nod to the beginner, Kurz uses English (i.e., inch) rather than metric (i.e., centimeter) measurements in his descriptions. He also provides habitat/range information and

comments that emerge from over 40 years of engagement with natural areas and species of the region. His information on uses by Native Americans is particularly fun.

The beginning to intermediate botanist will find in Kurz's *Prairie Wildflowers* an excellent overview of the rich heritage of our endangered prairies.

Paul Rothrock is a research scientist, associate curator of the IU Herbarium and a member of INPS South Central Chapter.
